

I claim:

1. An apparatus for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices, comprising:

at least one metering device and corresponding nozzle for metering liquid product;

a product collection receptacle subsystem for collecting liquid product dispensed by said at least one metering device;

a nozzle support subsystem for moving said at least one nozzle between a normal operating position and a position above said product collection receptacle subsystem; and

a controls/utilities subsystem connected to each of said at least one metering device, product collection receptacle subsystem and nozzle support subsystem for controlling the operation of the automatic calibration and set-up system.

2. The apparatus for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 1, wherein said nozzle support subsystem is manually cycled between a normal operating position and a position above said product collection receptacle subsystem.

3. The apparatus for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 1, wherein said nozzle support subsystem is automatically cycled between a normal operating position and a position above said product collection receptacle subsystem.

4. The apparatus for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 1, wherein said product collection receptacle subsystem further comprises a collection receptacle and means for emptying said receptacle.

5. The apparatus for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 4, wherein said product collection receptacle subsystem further comprises a level sensor removably attached to said receptacle.

6. The apparatus for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 4, wherein said product collection receptacle subsystem further comprises a load cell to which said receptacle is removably attached.

7. The apparatus for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 4, wherein said emptying means further comprise a receptacle liner that is manually removed and replaced.

8. The apparatus for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 4, wherein said emptying

means further comprise a drain port and drain line.

9. The apparatus for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 8, wherein said drain line is connected to a peristaltic pump.

10. The apparatus for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 4, wherein said emptying means further comprise a vacuum nozzle, a vacuum tank, a vacuum line running from said nozzle to said tank, and a pump to forcibly draw the contents of said receptacle into said tank.

11. The apparatus for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 10, wherein said pump is a vacuum pump.

12. The apparatus for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 10, wherein said pump is a peristaltic pump.

13. A method for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices, comprising the steps of prime/air purging liquid product into a receptacle and emptying of the receptacle.

14. The method for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 13, wherein said step of priming/air purging liquid product further comprises;

positioning one or more filling nozzles over a product collection receptacle; and
cycling one or more metering devices to draw liquid product from a product supply tank and push said product out through said one or more nozzles into a collection receptacle.

15. The method for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 13, wherein said step of emptying of the receptacle further comprises manual emptying of the receptacle.

16. The method for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 13, wherein said step of emptying of the receptacle further comprises gravity draining of the receptacle into a residual tank.

17. The method for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 13, wherein said step of emptying of the receptacle further comprises forced draining of the receptacle into a residual tank.

18. The method for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 13, further comprising the step of metering device calibration.

19. The method for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 18, wherein said step of metering device calibration further comprises;

positioning one or more filling nozzles over a product collection receptacle;

cycling a first metering device to dispense an amount of liquid product through one of said nozzles into said collection receptacle;

weighing said amount of liquid product dispensed by said first metering device;

comparing said dispensed amount of liquid product to a target fill volume/weight;

adjusting, if necessary, said amount of liquid product dispensed by said first metering device; and

repeating said cycling, weighing, comparing, and adjusting steps until said amount of liquid product dispensed by said first metering device is determined to be within a specified tolerance range.

20. The method for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 19, wherein said step of adjusting said dispensed amount of liquid product further comprises utilizing a control system algorithm to compare said target fill volume/weight to said actual amount dispensed and

automatically adjust, either upward or downward, said first metering device's operating parameters.

21. The method for automatic calibration and set-up, between production runs, of a liquid filling system's plurality of metering devices according to claim 19, wherein said steps of cycling, weighing, comparing, adjusting, and repeating are performed for a plurality of metering devices contained in said liquid filling system.

22. The method for automatic calibration and set-up of a liquid filling system's plurality of metering devices according to claim 13, further comprising the step of periodic fill weight verification.

23. The method for automatic calibration and set-up of a liquid filling system's plurality of metering devices according to claim 22, wherein said step of periodic fill weight verification further comprises;

suspending, for a brief period, normal operation of said liquid filling system;

positioning one or more filling nozzles over a product collection receptacle;

cycling a first metering device to dispense an amount of liquid product through one of said nozzles into said collection receptacle;

weighing said amount of liquid product dispensed by said first metering device;

comparing said dispensed amount of liquid product to a target fill volume/weight;

adjusting, if necessary, said amount of liquid product dispensed by said first metering device; and

repeating said cycling, weighing, comparing, and adjusting steps until said amount of liquid product dispensed by said first metering device is determined to be within a specified tolerance range.

24. The method for automatic calibration and set-up of a liquid filling system's plurality of metering devices according to claim 23, wherein said step of adjusting said dispensed amount of liquid product further comprises utilizing a control system algorithm to compare said target fill volume/weight to said actual amount dispensed and automatically adjust, either upward or downward, said first metering device's operating parameters.

25. The method for automatic calibration and set-up of a liquid filling system's plurality of metering devices according to claim 23, wherein said steps of cycling, weighing, comparing, adjusting, and repeating are performed for a plurality of metering devices contained in said liquid filling system and, when complete, normal operation of said liquid filling system is resumed.